

## Problem 3.21: Optimal Power Transmission

The following figure (ds) shows a general model for power transmission. The power generator is represented by a Thevinin equivalent and the load by a simple impedance. In most applications, the source components are fixed while there is some latitude in choosing the load.

1. Suppose we wanted to maximize "voltage transmission:" make the voltage across the load as large as possible. What choice of load impedance creates the largest load voltage? What is the largest load voltage?
2. If we wanted the maximum current to pass through the load, what would we choose the load impedance to be? What is this largest current?
3. What choice for the load impedance maximizes the average power dissipated in the load? What is most power the generator can deliver?

**Note:** One way to maximize a function of a complex variable is to write the expression in terms of the variable's real and imaginary parts, evaluate derivatives with respect to each, set both derivatives to zero and solve the two equations simultaneously.

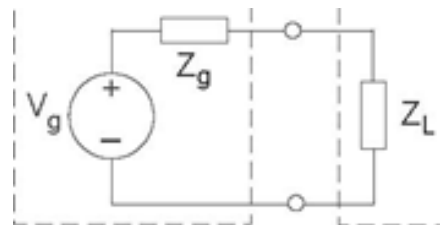


Figure 3.67 Optimal Power Transmission